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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,119	03/31/2004	David L. O'Meara	250643US6 YA	3702
22850 7590 04/05/2007 OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER
			1763	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/05/2007	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/05/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

Application No.	Applicant(s)	
10/813,119	O'MEARA ET AL.	
Examiner	Art Unit	
Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-40 and 42-45 is/are pending in the application.
  - 4a) Of the above claim(s) 10-15, 18-28, 32-38, 40 and 42-44 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-9, 16, 17, 29-31, 39 and 45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
  - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    - a) ☐ All b) ☐ Some \* c) ☐ None of:
      - 1. ☐ Certified copies of the priority documents have been received.
      - 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
      - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
  - Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)
  - Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

***DETAILED ACTION***

***Response to Arguments***

Applicant's arguments with respect to claims 1, 2-9, 16, 17, 29-31, 39, 41 and 45 have been considered and following response is given:

To applicant's argument that Toya et al does not disclose a recess into which a separately formed tube having a carbon heater is placed, examiner responds that Toya et al teach annular shaped tube sealed with carbon heater for semiconductor processing applications (Figures 37A, 37B, 38A). Toya et al additionally teach heater elements disposed in grooves (Figures 78-81). Further, Ogura et al teach substrate support with groove in which a sheathed heater is disposed. Both Toya et al and Ogura et al are concerned with substrate heating apparatus which provides the motivation to combine Toya et al with Ogura et al. Thus claim 1 has been rejected under 35 USC 103 (a) as explained below. Further, remaining claims 2-9, 16, 17, 29-31, 39 and 45 have also been rejected under 35 USC 103 (a) as explained below.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1-9, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Toya et al (US Patent No. 5,231,690).**

Regarding Claim 1: Ogura et al teach a wafer heating apparatus 110 (Figures 6A, 6B) comprising a support base 111 (holding device) that has a wafer support surface configured to support a wafer and a backside surface, and further has a groove 111a with its middle portion extending along the wafer surface and end portions that extend to openings in the backside surface of support base 111. A heater 112 is disposed in the groove 111a. Ogura et al also teach the support base is mounted in the processing chamber with the help of a support tube (Figure 6A and paragraphs 0006-0009).

Ogura et al do not teach details of heater (heating units) like carbon wire heater formed of fibers and enclosed in tube and terminals.

Toya et al teach heater units (Figures 37A, 37B, 38A) for semiconductor processing applications, comprising of carbon heater member 151 sealed within a tube 156. Further, Toya et al also teach a substrate heating apparatus (Figures 78-81) comprising lower and upper containers 511, 512 having grooves 516 whose middle portion extends along wafer surface and end portions of groove 519 extend vertically to openings through which terminal 521 is disposed. Toya et al further teach heating unit 515 mounted in recess 516, wherein each heating unit is disposed in a groove (recess) 519 extending along middle portion (due to heater being enclosed in the recesses 516 and end portions coming out (in pipe 513) through backside surface. It would be obvious to use annular shaped sealed tube with carbon heater (Figures 37, 38) disposed in the grooves 111a of support base 111 (Ogura et al – Figure 6A, 6B) [like recesses 516 in Figure 80 – Toya et al] to enable uniform heating of substrate supported on the holding device. Toya et al also teach that the carbon wire heater 515 comprises of carbon fiber bundle with middle

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section sealed (within upper and lower containers 512, 511) and opposing ends of heater extend to exterior of tube and through opening in the backside surface. Toya et al also teach terminals 523 connected to opposing ends of heater wire 515 (column 42, line 15 to column 83, line 30). Toya et al further teach that other configurations of connecting terminals are also possible (Figures 86-92). Though Ogura et al and Toya et al do not teach plurality of recesses or heating units it would be obvious to provide plurality of heating units in respective recesses to maintain better uniformity of temperature on the wafer surface especially for large area wafers like 300 mm wafers.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use carbon wire heater enclosed in tube and disposed in recesses, with carbon heater comprising of carbon fibers as taught by Toya et al in the apparatus of Ogura et al et al to enable obtain increased tensile strength of heaters at high temperatures besides generating even temperature and maintain strength and durability of heating units for long period of time (column 13, lines 35-45).

Regarding Claims 2-9: Toya et al ('690) teach that heating element could be circular or flat. Further, it would be obvious to change shape of heating element with its tube (and therefore shape of groove) as per shape of substrate to maintain uniformity of temperature and obtain desired temperature profiles.

Regarding Claim 39: Toya et al ('690) teach (Figures 84, 85) that two carbon heaters 601 can be combined to form a circular heater surface suitable for semiconductor wafers. Further, it would be obvious to duplicate the wafer heating assembly (including holding device with corresponding heating units) to increase through-put during wafer processing.

In this connection it has been ruled by courts (Case law):

"Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960)."

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**Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Toya et al (US Patent No. 5,231,690) as applied to claim 1 and further in view of Turner et al (US Patent No. 6,688,375).**

Regarding Claim 16: Ogura et al in view of Toya et al teach all limitations of the claim except thermal barrier and cooling unit in the wafer heating assembly.

Turner et al teach an apparatus (Figure 3A) that includes a cassette (substrate holder) 30 for holding substrate S and having a heating section 32 and a heat shield (thermal barrier) 36 coupled to substrate holder and which isolates the heating section 32 from a cooling section 34 (column 5, line 50 to column 6, line 15).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a thermal barrier and a cooling unit in the substrate holder as taught by Turner et al in the apparatus of Ogura et al in view of Toya et al to enable isolate heating and cooling sections.

**Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Toya et al (US Patent No. 5,231,690) as applied to claim 1 and further in view of Szekeresch et al (US Patent No. 6,919,538).**

Regarding Claim 17: Ogura et al in view of Toya et al teach all limitations of the claim except temperature sensor coupled to substrate holder.

Szekeresch et al teach an apparatus (Figure 1) that includes a base plate (substrate holder) 3 for holding substrate S and having grooves 7 that help divide the underside of plate 3 into plurality of square shaped heating elements 10 and where each heating element (that is substrate holder) is provided with temperature sensors (not shown in figure) (column 4, lines 10-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a temperature sensors with holding device as taught by Szekeresch et al in the apparatus of Ogura et al in view of Toya et al to enable monitor the temperature of holding device.

**Claims 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PG PUB No. 2002/0125240) in view of Toya et al (US Patent No. 5,231,690) as applied to claim 1 and further in view of Takahashi et al (US Patent No. 6106,628).**

Regarding Claim 29: Ogura et al in view of Toya et al teach all limitations of the claim except a cover coupled to holding device.

Takahashi teach an apparatus (Figure 1) that includes a wafer heating assembly comprising:  
a base (holding device) B with susceptors 8, 9 and having a plurality of grooves (recesses) 14, the base (holding device) having turntables (wafer supports) 2, 3 configured to support a wafer 1;  
a plurality of heating units 4, 5 disposed in respective grooves (recesses) 14 wherein at least one heating unit comprises heater 13;  
rotary shafts 6, 7 to which turn-tables are attached on a common axis of rotation C.

Takahashi further teach that heaters 13 are resistive heaters and are enclosed by quartz cover plate 16.  
Takahashi also teach turn-tables 2, 3 (like cover) coupled to the base (holding device) B {Figure 1 and column 2, line 15 to column 3, line 5}.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a cover for being coupled to heating device as taught by Takahashi in the apparatus of Ogura et al in view of Toya et al to enable provide transmission of thermal energy from the heaters and also provide mechanical protection to the heaters.

**Claims 30, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Toya et al (US Patent No. 5,231,690) and Takahashi as applied to claim 29 and further in view of Szekeresch et al (US Patent No. 6,919,538).**

Regarding Claim 30, 31: Ogura et al in view of Toya et al and Takahashi teach all limitations of the claim except raised portions on the cover.

Szekeresch et al teach an apparatus (Figure 1) that includes a base plate (substrate holder) 3 for holding substrate S and having grooves 7 that help divide the underside of plate 3 into plurality of square shaped heating elements 10 and where each heating element (that is substrate holder) is provided with temperature sensors (not shown in figure) (column 4, lines 10-50). Further, Szekeresch et al also teach a plurality of substrate holding means (like raised portions {not shown in figure} for holding substrate 12 (Szekeresch et al – Figure 1 and column 4, lines 55-65). Further it is known in art to use a temperature sensor as one of the substrate supporting pins (raised portion).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide substrate handling means in the cover (raised portions) as taught by Szekeresch et al in the apparatus of Ogura et al in view of Toya et al and Takahashi to enable safe handling of wafers inside the processing chamber.

**Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Toya et al (US Patent No. 5,231,690) as applied to claim 1 and further in view of Schaper et al (US Patent No. 6,353,209).**

Regarding Claim 45: Ogura et al in view of Toya et al teach all limitations of the claim except alternate cooling mechanism corresponding to carbon wire heating elements to increase speed of thermal response and configured to flow gas or other coolant fluid.



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Schaper et al teach an apparatus (Figure 4A, 7A-C) that includes a thermal processing module 50 for temperature control of substrate 10 and includes heating elements 56 whose temperature can be independently controlled and further includes a cooling plate (cooling mechanism) 62 that helps to cool or control the ramp rate of individual heating elements [column 3, line 20 to column 4, line 10 and column 5, line 5 to column 6, line 55).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide cooling mechanism as taught by Schaper et al in the apparatus of Ogura et al in view of Toya et al to achieve desired temperature profiles during substrate processing.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763